

Chapter 3 States of Matter

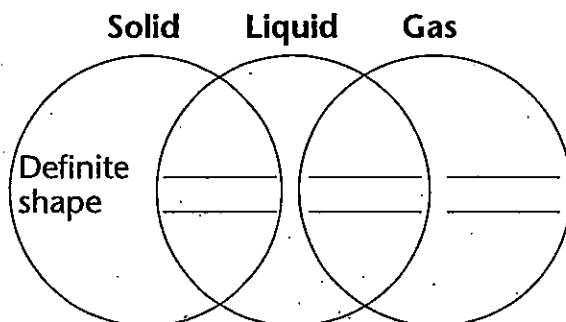
Section 3.1 Solids, Liquids, and Gases

(pages 68–74)

This section explains how materials are classified as solids, liquids, or gases. It also describes the behavior of these three states of matter.

Reading Strategy (page 68)

Comparing and Contrasting As you read about the states of matter, fill in the blanks in the diagram below with one of these phrases: *definite volume*, *variable volume*, or *variable shape*. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

**Describing the States of Matter** (pages 68–70)

- What are three common states of matter?
 - Solids
 - _____
 - _____
- Is the following sentence true or false? The fact that a copper wire can be bent shows that some solids do not have a definite shape. _____
- Circle the letter of each phrase that describes how particles at the atomic level are arranged within most solids.
 - randomly arranged
 - packed close together
 - arranged in a regular pattern
- Is the following sentence true or false? A liquid takes the shape of its container. _____
- Is the following sentence true or false? A gas takes the shape and volume of its container. _____
- On the sun, where temperatures are extremely high, matter exists in a state known as _____. Circle the correct answer:
 plasma liquid condensation

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7. Complete the table about states of matter.

States of Matter		
State	Shape	Volume
Solid	Definite	
Liquid		
		Not definite

Kinetic Theory (page 71)

8. Define kinetic energy. _____

9. Circle the letter of the phrase that describes all particles of matter in the kinetic theory of matter.

- a. randomly arranged
- b. constant temperature
- c. in constant motion

Explaining the Behavior of Gases (pages 72-73)

10. Is the following sentence true or false? There are forces of attraction among the particles in all matter. _____

11. Is the following sentence true or false? Because of the constant motion of the particles in a gas, the gas has a definite shape and volume.

Explaining the Behavior of Liquids (page 73)

12. Do forces of attraction have a stronger effect on the behavior of the particles in a gas or in a liquid? _____

13. Circle the letter of each factor that affects the behavior of liquids.

- a. fixed location of particles
- b. constant motion of particles
- c. forces of attraction among particles

Explaining the Behavior of Solids (page 74)

14. Solids have a definite volume and shape because particles in a solid vibrate in _____ locations. Circle the correct answer.

orderly several fixed

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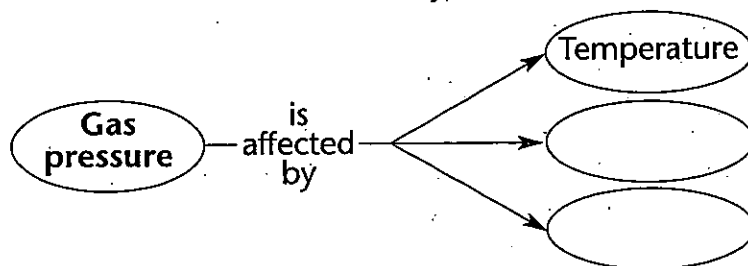
Section 3.2 The Gas Laws

(pages 75–81)

This section discusses gas pressure and the factors that affect it. It also explains the relationships between the temperature, volume, and pressure of a gas.

Reading Strategy (page 75)

Identifying Cause and Effect As you read, identify the variables that affect gas pressure. Write them in the diagram below. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

**Pressure (pages 75–76)**

1. What causes the pressure in a closed container of gas? _____
2. Circle the letter of each unit used to express amounts of pressure.
a. newton b. joule c. pascal

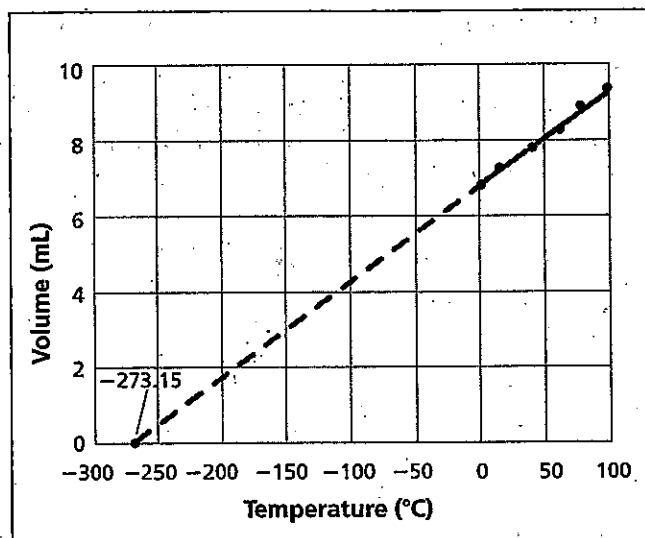
Factors That Affect Gas Pressure (pages 76–77)

3. Name the factors that affect the pressure of an enclosed gas.
a. Its temperature b. _____ c. _____
4. Is the following sentence true or false? In a closed container, increasing the temperature of a gas will decrease the force with which particles hit the walls of the container. _____
5. Raising the temperature of a gas will _____ its pressure, if the volume of the gas and the number of its particles are kept constant. Circle the correct answer.
have no effect on decrease increase
6. Increasing the number of particles of a gas will _____ its pressure if the temperature and the volume are constant. Circle the correct answer.
have no effect on decrease increase

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Charles's Law (page 78)

7. Jacques Charles recorded the behavior of gases on a graph like the one below. The data show that the volume of a gas increases at the same rate as the _____ of the gas.



8. A temperature equal to 0 K on the Kelvin temperature scale is known as _____. Circle the correct answer.

Kelvin zero relative zero absolute zero

Boyle's Law (page 79)

9. Boyle's law states that there is an inverse relationship between the pressure and volume of a gas. Circle the letter of the correct expression of this relationship.

a. $P_1V_1 = P_2V_2$

b. $\frac{P_1}{V_1} = \frac{P_2}{V_2}$

c. $P_1P_2 = V_1V_2$

The Combined Gas Law (pages 80-81)

10. Circle the letters of the factors that are included in the expression of the combined gas law.
- a. temperature
 - b. number of particles
 - c. volume

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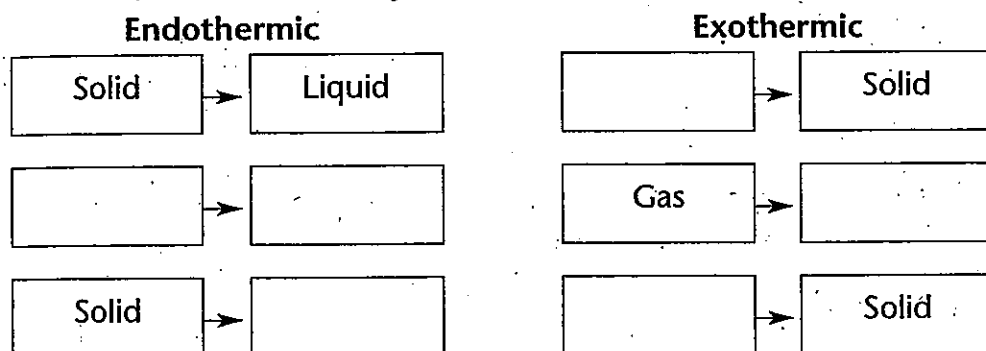
Section 3.3 Phase Changes

(pages 84–91)

This section explains what happens when a substance changes from one state of matter to another and describes six phase changes.

Reading Strategy (page 84)

Summarizing As you read, complete the description of energy flow during phase changes in the diagram below. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

**Characteristics of Phase Changes** (pages 84–86)

1. A _____ is the reversible physical change that takes place when a substance changes from one state of matter to another.

Match each term with the letter of the phase change that best describes it.

Term	Phase Change
_____ 2. freezing	a. Solid to gas
_____ 3. sublimation	b. Liquid to gas
_____ 4. condensation	c. Gas to solid
_____ 5. melting	d. Liquid to solid
_____ 6. deposition	e. Gas to liquid
_____ 7. vaporization	f. Solid to liquid

8. Does the temperature of a substance increase, decrease, or remain constant during a phase change?

9. A substance absorbs energy from its surroundings during a(n) _____ change. Circle the correct answer.

exothermic endothermic hydrothermic

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10. The energy absorbed by one gram of ice as it melts is known as the _____ for water. Circle the correct answer.

heat of fusion heat of condensation heat of vaporization

11. As water freezes, it releases heat to its surroundings. Freezing is an example of a(n) _____ change.

Melting and Freezing (page 88)

12. Is the following sentence true or false? Water molecules have a more orderly arrangement in ice than in liquid water. _____
13. When liquid water freezes, the average kinetic energy of its molecules _____.

Vaporization and Condensation (pages 88-90)

14. Use the words in the box below to fill in the blanks.

gas	liquid
-----	--------

- Vaporization is the phase change in which a substance changes from a(n) _____ into a(n) _____.
15. The energy absorbed by one gram of water as it changes from its liquid phase into water vapor is known as the _____ for water.
16. Is the following sentence true or false? When water vapor collects above the liquid in a closed container, the pressure caused by the collisions of this vapor and the walls of the container is called vapor pressure. _____
17. The phase change in which a substance changes from a gas into a liquid is called _____.
18. Is the following sentence true or false? A gas absorbs energy as it changes into a liquid. _____

Sublimation and Deposition (page 91)

19. Dry ice can change directly from a solid to a gas without forming a liquid first. This process is an example of _____.
20. _____ is the phase change in which a substance changes directly from a gas to a solid without changing to a liquid first.

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WordWise

Use the clues and the words below to help you write the vocabulary terms from the chapter in the blanks. Use the circled letter in each term to find the hidden vocabulary word. Then, write a definition for the hidden word.

endothermic
Charles's law
solid

evaporation
condensation
sublimation

exothermic
deposition

Clues

The process that changes a substance from a liquid to a gas below the substance's boiling point

A gas law that states that the volume of a gas is directly proportional to its temperature

The phase change in which a substance changes directly from a gas to a solid

The state in which matter has both a definite shape and a definite volume

The phase change in which a substance changes from a gas to a liquid

The phase change in which a substance changes directly from a solid to a gas

The type of phase change in which a substance releases energy to its surroundings

The type of phase change in which a substance absorbs energy from its surroundings

Vocabulary Terms

_____○_____

_____○_____

_____○_____

_____○_____

_____○_____

_____○_____

_____○_____

_____○_____

Hidden Term: _____

Definition: _____

